AMENDMENT TO SPECIFICATION

Please amend the title to read:

MICRO MODE FOCUSING APPARATUS FOR DIGITAL STILL CAMERA USING FOCUS DRIVING MOTOR

Please amend the paragraph bridging pages 1-6 as follows:

Field of the Invention

The present invention relates to an electronic still camera, and in particular to a micro mode executing apparatus of a digital still camera ~~using a focus driving motor~~, in which an image sensor and a focus controlling lens are connected to a focus driving motor and a spindle of the motor, thereby controlling an optical length within a range of not changing a barrel structure.

Description of the Prior Art

Recently, while electronic still cameras recording a still image on a magnetic disc in a form of an electrical image signal ~~has~~have been developed, the electronic still camera has to control the focusing by moving a focus ring of the photographing lens, such as a typical still camera using a silver-salt film.

In that case, the automatic focusing control may be performed by an automatic focus mechanism. The automatic focus mechanism detects ~~a~~ the distance from the camera to a subject ~~to move~~ and moved the focus ring of the photographing lens based on the distance information.

Meanwhile, in a video camera, a photographing signal itself detects ~~a~~ focus information for an automatic focus control to perform the automatic focus control without detecting the distance. Specifically, when the focus control of the lens is proper~~, since~~ so that the profile of the subject can be photographed distinctly, ~~a~~ there is no high band ~~of a~~ frequency component ~~is not contained~~ in the

~~photographing~~ photograph signal. When the focus control of the lens is not proper, since the profile of the subject is blurred, there is a high band ~~of a~~ frequency component in the signal.

Accordingly, the automatic focus control is performed by detecting ~~an~~ the amount of ~~a~~ high band ~~of a~~ frequency components contained in the photographing signal to determine whether the state of ~~a present~~ the focus control is proper or not.

A zoom lens is widely used as a photographing lens mounted onto the camera. Using such a zoom lens, a focusing distance may be successively varied, so that ~~a~~ photography can be achieved in an optional viewing angle between a wide angle and a telescope angle.

However, in the zoom lens, if the focus distance is varied, there is a problem in that the focus position is also varied. Specifically, since it adjusts accurately the focus of the subject before varying the focus distance, although there is no ~~the~~ variation of the distance from the camera to the subject, the focus of the subject is deviated, if the focus distance is varied.

In the typical zoom lens, in order to prevent the focus from being deviated, if a zoom ring for adjusting a focus distance rotates, ~~the~~ a focus adjusting lens is gradually moved by components, such as a cam groove, so that the focus position may be compensated in line with the variation of the focus distance.

As shown in FIG. 1, in a high-grade camera, an application of a micro mode increases the ability to photograph an object that is close to the camera, i.e. not far off a limited distance predetermined in ~~a~~ the lens design. Such a micro mode photographs a near object by extending ~~a~~ the total length of ~~a~~ the camera optical system, ~~with submitting to the~~ while allowing degradation of ~~a~~ the photographing performance of the lens.

With reference to FIG. 1, a position of the focus on which the object OBJ is photographed on a position of a normal lens LENS is designated by a reference numeral F1. At that time, if the lens is moved forwardly, the distance between the object OBJ and the lens is shortened to vary the position of the focus of the object to be photographed.

Accordingly, although the lens moves substantially, supposing that the position of the lens is fix as shown in FIG. l, the object OBJ moves relative~~ly~~ to the lens to produce a virtual image of the object designated by a reference numeral IOBJ. Therefore, the focus of the object to be photographed by the virtual image of the object is positioned as a reference numeral F2.

Specifically, in the electronic still camera, in order to move the lens from or to the image sensor, the camera has to have two lenses as shown in FIG. 2, and a transferring guide member having a barrel structure to transfer ~~each lens has to be provided~~ or moved.

The application of the micro mode of the conventional electronic still camera will be described with reference to FIG. 2.

The focusing mode of the conventional electronic still camera includes an object lens Lo faced to the object, and an image lens Li faced to an image sensor IS. The focusing mode is determined by transferring or moving any of the lenses.

In case of transferring the image lens Li to apply the micro mode, there is an advantage in that since the image lens and the object lens have a stable position due to the solidity of the barrel structure as shown in FIG. 2, the performance of the camera can be constantly maintained. Also, the transferred image lens is secured to have an optical stability.

However, there is a disadvantage in that since the distance FL between the image sensor and the object lens is fixed, the camera does not satisfy the anticipation of the micro mode.

SUMMARY OF THE INVENTION

It is, therefore, an object of the present invention to provide a micro mode executing apparatus of a digital still camera ~~using a focus driving motor~~, in which an image sensor and a focus controlling lens are connected to a focus driving motor and a spindle of the motor, thereby controlling an optical length within a range ~~of not changing~~ set by a barrel structure.

To achieve the above object, according to one aspect of the present invention, there is provided a micro mode executing apparatus for a digital still camera, the apparatus comprising: a focus lens and an image sensor arranged sequentially with an optical axis passing through centers of the lens and the sensor; transferring means~~,~~ provided integrally an the image sensor~~,~~ for transferring the focus lens and the image sensor along the optical axis; a first transferring area defining portion of the structure for defining a transferring area of the focus lens transferred by the transferring means; a second transferring area defining portion of the structure for defining the transferring area of the focus leans transferred horizontally along the optical axis by the transferring means, when the focus lens is not further transferred by the first transferring area defining portion; and transferring movement limiting means for preventing the image sensor from transferring when the focus lens is transferred in an area defined by the first transferring area defining portion according to the operation of the transferring means.

Please amend the paragraph bridging pages 8-10 as follows:

Referring to Figs. 3 and 4, the focus driving motor comprises a focusing motor 6 ~~being transferred~~ moved along a focusing motor spindle 8 by ~~being changed~~ having its rotating direction changed according to an applied electrical signal ~~with reference to the focusing motor spindle~~,. ~~a~~An image sensor module 7, is integrally mounted on one side of the focusing motor through a fixing member~~, for converting~~ so as to convert an image of an object to be photographed to an electrical signal~~,~~. ~~a~~A focus lens module 5 is positioned on a same optical axis as the image sensor module 7 and is secured to one end of the focusing motor spindle 8~~,~~. ~~a~~A housing h, consisting of a housing B 2 for limiting a transferring area of the focusing motor 6, a housing A 1 for limiting a transferring area of the focus lens 5, and a barrel structure 9 having a step~~,~~2. ~~a~~A first spring 3 is connected to the focus lens module 5 and the focusing motor 6 and ~~having~~ has a constant biasing force~~, and a~~. A second spring 4 ~~for positioning~~ positions the motor on the housing B 2 by applying a biasing force ~~to~~ in a lateral direction.

The operation of the micro mode executing apparatus of the digital still camera using the focus driving motor according to the present invention will now be explained.

In case of a typical photograph, as shown in FIG. 3, the image sensor module 7 is fixed on a surface of the housing ~~b~~ B 2 by the second spring 4, and the focus lens module 5 ~~in~~ close to ~~an~~ a distal end of the spindle 8 of the focusing motor 6 by the first spring ~~(1)~~ 3 to bring to the image to a focus ~~along the~~ by movement of the spindle of the focusing motor.

At that time, the motor 6 is fixed to the image sensor module 7, and uses a motor movable perpendicular to a rotating surface of the focusing motor spindle 8 in response to the rotation of the focus motor 6.

The first spring 3 serves as a pulling member far attracting the focus lens module 5 and the image sensor module 7, so that the focus lens module 5 moves in close to the focusing motor spindle 8. In addition, the second spring 4 serves as a fixing member for ~~foxing~~ fixing the image sensor module 7 to the surface of the housing B 2 when not ~~at~~ in the micro mode, ~~while~~ and also serves as a contacting member for contacting the image sensor module 7 and the focus lens module 5 to the surface of the housing A 1 ~~at~~ when in the micro mode.

Since the optical system is extended, in order to accomplish the micro mode, the object to be photographed moves gradually toward the lens, so that the focus lens module 5 is ~~in~~ close ~~with~~ to the housing A 1. After the focus lens module 5 is a ~~in~~ close ~~with~~ to the housing A 1, the focusing motor 6 rotates ~~still~~ so as to compress further the second spring 4, thereby moving the image sensor module 7.

Providing ~~the~~ a digital still camera using the focus driving motor according to the present invention with the micro mode executing apparatus, the image sensor module 7 is fixed to the housing B 2 when the micro mode ~~does~~ is not in use, while the image sensor module 7 moves only ~~at~~ when in the micro mode, thereby securing the stable photographing performance.

Also, since the image sensor module 7 is driven through the focusing motor 6, there is ~~not~~ no needed for a separate driving motor for executing the micro mode.

In addition, since the micro mode is executed using the focusing motor 6, an auto focusing function using the focusing motor 6 can be adapted at the micro mode.

While the invention has been shown and described with reference to certain preferred embodiments thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention as defined by the appended claims.